Notes on Insects Found on Pineapple Planting Material*

BY K. ITO AND DR. WALTER CARTER

(Presented at the meeting of December 3, 1931)

In the study of insects and their relation to pineapple production, investigations have shown that injurious insects, such as mealybugs and scales, which are closely attached to the host plant upon which they feed and propagate, can be disseminated over a wide area by the use of planting materials infested with them.

At the present time it would appear that the difficulties of mechanical handling precludes the treatment of planting material prior to planting in the usual fall planting season. Experience has shown, as a matter of fact, that the great majority of the insect populations on this planting material disappear due to natural causes within a few months after planting, even though the percentage that remains infested still presents an important problem. The planting material to be used for replanting, however, is stored on trimming grounds during winter in closely packed masses. Frequently this material can be seen heavily infested with *Diaspis bromeliae* (Kern.), the pineapple scale, when it is planted in the spring. It was thought that possibly some simple method of treating this planting material could be devised which would insure cleaner planting material being used for replants. The importance of using clean planting material for replants is very great since at the time it is planted the surrounding plants are growing in a very succulent condition, so that there is a tendency for the insects on the dry freshly planted replants to move on to the adjoining older plants. The result is that considerable spread of insects may occur.

In December, 1930, an experiment to determine the effect of high temperature in checking insect infestation on pineapple planting material, while in the process of curing on the trimming grounds, was initiated at two separate localities in the Helemano section of the Hawaiian Pineapple Company's fields. The

* Published with the approval of the Director as Technical Paper No. 48 of the Experiment Station of the Association of Hawaiian Pineapple Canners, University of Hawaii.

primary purpose of this investigation was to collect quantitative data on insect fauna present and to determine the effect of atmospheric heat on the pineapple scale infesting planting material.

In carrying out the experiment, part of the planting material on the trimming ground was enclosed, butt ends up, under a large celoglass-covered enclosure where the temperature was thought to become sufficiently increased to clean the planting material of insect infestation. Another part of the material was left out in the open, with the butts of the plants turned upward, as in ordinary practices of curing.

Temperature records were kept of three different conditions at the two places as follows: (1) Thermograph under standard shade; (2) with the thermo-element placed at a horizontal position about two inches above the ground in the middle of the check materials; (3) with the thermo-element placed at a horizontal position about two inches above the ground in the middle of the material under the celoglass-covered enclosure.

Final analysis of the different thermograph records at the two places showed no marked significance so far as the anticipated effects of temperature were concerned. The various insects seemed to persist under both celoglass and check conditions. Although the temperature rose as high as 99°F. when a mercury thermometer was exposed to the air on the butts of the plants under the celoglass, the temperatures obtaining within the mass of material showed only slightly higher temperature fluctuations than under the check, due to the insulation that the closely appressed planting material provided to the penetration of heat to the lower portions of the plant on which the insects were invariably found.

Comparison of the corresponding records of the two places manifested no greater variations than those encountered in the different sets of the one place. Consequently, all the following data on insect populations have been combined and considered as having existed under the same conditions of environment. Table 1 shows the weekly average maximum and minimum temperatures for the duration of the experiment.

TABLE 1. HELEMANO STATION STANDARD SHADE HYGRO-THERMOGRAPH RECORD

Week ending	Temperature		Humidity	
	Av. of daily maxima	Av. of daily minima	Av. of daily maxima	Av. of daily minima
12/21/30	74.5	67.1	89.0	57.0
12/28/30	75.1	62.7	90.0	53.0
1/ 4/31	74.9	62.4	84.5	50.1
1/11/31	75.8	65.6	89.0	55.3
1/18/31	75.0	61.3	89.9	52.1
*1/25/31	75.5	55.2	91.2	45.7
2/ 1/31	74.1	59.8	90.9	51.9
2/ 8/31	73.6	61.9	89.6	50.1
2/15/31	71.3	63.3	91.5	61.4
2/22/31	75.3	64.6	90.7	50.7
3/ 1/31	73.5	62.0	91.7	57.3
3/ 8/31	73.9	60.6	89.4	49.6
3/15/31	76.2	59.9	91.1	50.8

Records of the different species of insects encountered during the dissection of the planting material samples for the counting of the scales on the leaves are shown in Table 2. The first random sample of 55 plants was examined on December 17-19, 1930, at the beginning of the experiment and illustrates the kinds and degrees of initial populations. The data from the second sample were obtained by examining 120 plants at the conclusion of the experiment on March 25, 1931, and represent the populations that had accumulated during the winter. To simplify comparison, the data presented in the tables are a revision of the original data from the two unequal samples calculated on the basis of 100 plants per sample.

* Average of three days only. Recorder had stopped.

TABLE 2. INSECT SPECIES FOUND ON PINEAPPLE PLANTING MATERIAL STORED ON TRIMMING GROUNDS

Insect Species	No. of Individuals 1st Sample Dec. 1930	2nd Sample Mar. 1931
Araneida (Spiders)*	36	7
Acarina (Mites)	36	3
Collembola (Springtails)	38	67
Orthoptera:		
Blattidae (*Cutilia soror* Brunner)	....	1
Dermaptera (*Euborellia annulipes* Lucas)*	....	3
Corrodentia (*Ectopsocus fullawayi* Endl. and *E. hawaiiensis* Endl.)	104	27
Thysanoptera:		
Phloeothripidae (*Dolerothrips carteri* Watson)	129	51
Homoptera:		
Coccidae (*Pseudococcus brevipes* Ckll.)	293	11
(*Diaspis bromeliae* Kerner)	5851	583
Hemiptera:		
Reduviidae (*Empicoria rubromaculata* Blkb.)*	....	7
Coleoptera:		
Coccinellidae (*Sticholotis punctatus* Crotch)*	....	2
Nitidulidae (*Carpophilus humeralis* Fabr.)	....	1
Cucujidae (*Cryptamorpha desjardinsi* Guer.)*	....	20
Diptera:		
Chironomidae (Midge larvae)	63	8
Lepidoptera:		
Tineidae (*Ereunetis flavistriata* Walsm.)	80	5
Hymenoptera:		
Formicidae (*Pheidole megacephala* Fabr.)	13	1

CONCLUSION

It appears clear from the data that pineapple scale can maintain itself on dried planting material on the trimming ground. The same is true of the pineapple mealybug, *Pseudococcus brevipes* (Ckl.), in a lesser degree. At the beginning of the experiment the initial populations consisted mainly of phytophagus insects. The sample at the close of the experiment showed the persistence of these species with considerable reduction in numbers and the introduction of a number of predacious forms. It would appear then that careful selection of planting material to be used as replants would constitute the best control, since the reproduction of any phytophagus forms which may be on the plant would be severely limited by the accumulation of predators.

* Predacious forms.